THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

METROLOGY ENGINEERING AND CALIBRATION CENTER (MECC)

Cairo, Egypt

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 18 June 2005*).

AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION
CORPORATE SEAL 1978 DISTRICT OF COLUMBIA
A2LA

Presented this 9th day of June 2005

President
For the Accreditation Council
Certificate Number 2336.01
Valid to August 31, 2007
REVISED November 29, 2006

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005
& ANSI/NCSL Z540-1-1994

METROLOGY ENGINEERING AND CALIBRATION CENTER (MECC)
EAF/MECC Cairo West Air Force Base
Cairo, Egypt
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CALIBRATION

Valid To: August 31, 2007 Certificate Number: 2336.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1]:

I. Electrical – DC/Low Frequency

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
DC Resistance – Measure, Calibration of DC Resistors and DC Resistance Measuring Devices	(1 to 10) μΩ (10 to 100) μΩ 100 μΩ to 1 mΩ (1 to 10) mΩ (10 to 100) mΩ 100 mΩ to 1 Ω (1 to 10) Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ	500 parts in 10^6 20 parts in 10^6 1.1 parts in 10^6 0.18 parts in 10^6 0.18 parts in 10^6 0.17 parts in 10^6 0.23 parts in 10^6 0.24 parts in 10^6 0.32 parts in 10^6 0.32 parts in 10^6	Measurement International MI6010 low resistance bridge
	(10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ (100 to 500) MΩ 500 MΩ to 1 GΩ	0.11 parts in 10^6 0.22 parts in 10^6 0.27 parts in 10^6 1.6 parts in 10^6 7 parts in 10^6 13 parts in 10^6	Measurement International MI6010 high resistance bridge
DC Voltage – Measure, Calibration of DC Zener Standards and other Voltage Sources, Fixed Points	1.018 V 1 V 10 V	0.34 parts in 10^6 0.34 parts in 10^6 0.20 parts in 10^6	Fluke 7001 solid state reference standards (Zener)

II. Electrical – RF/Microwave

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Attenuation – Measure, Calibration of Attenuators 50 MHz to 18 GHz	 Type N Coaxial, Up to 119 dB 3 dB 6 dB 10 dB 20 dB 30 dB 50 dB Type 3.5 mm Coaxial Up to 109 db 3 dB 6 dB 10 dB 20 dB 30 dB 40 dB	 0.12 dB 0.11 dB 0.10 dB 0.11 dB 0.11 dB 0.12 dB 0.12 dB 0.13 dB 0.12 dB 0.11 dB 0.15 dB 0.12 dB	 Agilent 8510C network analyzer with type-N & 3.5 mm verification & calibration kits: 85055A/85053B 85054B/85052A
RF Power – Measure, Calibration of RF Power Calibration Factors	(10 to <50) MHz (0.05 to <9.6) GHz (9.6 to <15.75) GHz (15.75 to 18) GHz	1.3 % 1.1 % 1.2 % 1.3 %	Tegam RF power measurement system with M1110, 1110 WPC thermistor mounts

III. Time and Frequency

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Frequency – Measuring Equipment, Calibration of Cesium Frequency Standards	5 and 10 MHz 10 MHz	2.4 parts in 10^{13} 3.3 parts in 10^{13}	W/FMAS (automated frequency system from NIST) Agilent 5071A cesium beam

IV. Thermodynamics

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Temperature – Measuring Equipment, Calibration of SPRTs, Thermocouples, and Thermistors, Fixed Points			Hart 1590 bridge and ITS 90 fixed point cells:
	-38.8344 °C	0.73 mK	Mercury: TP ITL-M-17724
	0.01 °C	0.73 mK	Water: TPW A-13
	29.7646 °C	0.75 mK	Gallium: ITL-M-17401G
	231.928 °C	1.9 mK	Tin: ITL-M-17699
	419.527 °C	3.2 mK	Zinc: ITL-M-17671
	660.323 °C	5.4 mK	Aluminum: ITL-M-17676
Relative Humidity – Measuring Equipment, Calibration of RH Meters	10 % to 50 % RH 51 % to 95 % RH	0.35 % RH 0.60 % RH	Thunder Scientific 2500 humidity generator

V. Mechanical

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Pneumatic Pressure – Measure			
(Absolute) Calibration of Precision Absolute Pressure Transducers and Gauges	(2.5 to 25) psi (10 to 100) psi (100 to 1000) psi	0.0018 psi + 28 parts in 10^6 0.0018 psi + 22 parts in 10^6 0.0018 psi + 44 parts in 10^6	Ruska 2465 and vacuum reference
Schwien Manometer	(0.5 to 110) inHg	0.003 inHg + 16 parts in 10^6	Schwien 110 inHg mercury manometer and vacuum reference

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Pneumatic Pressure – Measure			
Calibration of Precision Pressure Transducers and Gauges	(2.5 to 25) psi (10 to 100) psi (100 to 1000) psi	0.0018 psi + 25 parts in 10^6 0.0018 psi + 21 parts in 10^6 0.0018 psi + 43 parts in 10^6	Ruska 2465 standard deadweight piston gage
	(10 to <1000) psi (1000 to 1500) psi (1500 to 2000) psi (1500 to <10 000) psi	0.064 psi + 43 parts in 10^6 0.086 psi + 43 parts in 10^6 0.086 psi + 79 parts in 10^6 0.22 psi + 79 parts in 10^6	Ruska 2480 standard deadweight piston gage
Fixed Point	10 000 psi	0.62 psi + 79 parts in 10^6	
Schwien Manometer	(0.5 to 110) inHg	0.003 inHg + 16 parts in 10^6	Schwien 110 inHg mercury manometer
Hydraulic Pressure – Measure, Calibration of Precision Pressure Transducers and Gauges	(10 to 1500) psi (1500 to <10 000) psi	0.013 psi + 35 parts in 10^6 0.013 psi + 75 parts in 10^6	Ruska 2480 deadweight piston gage
Fixed Point	10 000 psi	0.06 psi + 75 parts in 10^6	
Pressure – Measure, Calibration of Oxygen Pressure Gages	(0 to <30) psi (0 to 3000) psi	0.64 % FS 0.36 % FS	King Nutronics 3461-1-104
Force – Measuring Equipment, Calibration of Load Cells and other Force Devices	(100 to 12 000) lbf	140 parts in 10^6	Morehouse 12 000 lbf dead weight machine

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Mass – Measure, Calibration of Weights and Weight Sets	(1, 2, 5, 10, 20, 50) mg (100, 200) mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 500 g 1 kg 2 kg 3 kg 5 kg 10 kg 20 kg	2.8 µg 2.8 µg 2.9 µg 3.2 µg 3.5 µg 7.6 µg 10 µg 15 µg 29 µg 58 µg 0.11 mg 0.27 mg 0.53 mg 3.4 mg 2.2 mg 3.9 mg 5.8 mg 13 mg	Double substitution using Precision Mass Comparators
Balances	1 mg to 2 g (5 to 100) g (200 to 1000) g (2 to 20) kg	2.7 µg 6.3 µg 14 µg 1.4 mg	Class E2 weights

VI. Dimensional

Parameter/Equipment	Range	Best Uncertainty[2, 3] (±)	Comments
Gage Blocks – Measure			
Chromium Carbide Steel and Tungsten	(0.05 to 0.09375) in	3.1 µin	Mahr Federal comparator
Chromium Carbide Tungsten Steel	(0.1 to 1.0) in (0.1 to 1.0) in (0.1 to 1.0) in	(2.2 + 0.5L) µin (2.2 + 0.6L) µin (2.2 + 0.7L) µin	
Chromium Carbide Tungsten Steel	(2.0 to 4) in (2.0 to 4) in (2.0 to 4) in	(1.5 + 0.9L) µin (1.5 + 1.0L) µin (1.5 + 1.0L) µin	
Long –Steel	(5 to 20) in	(4.0 + 0.84L) µin	

Parameter/Equipment	Range	Best Uncertainty[2, 3] (±)	Comments
Linear Measurements – Precision tapes, rulers, lead screws, & other length measuring devices.	Up to 110 in	230 µin	HP 5529A laser system
Micrometers – Micrometer Heads, Depth Gages	Up to 78 in	300 µin + 0.6*R*	Compared against gage blocks

VII. Fluid Quantities

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Liquid Flow – Measure, Precision Turbine Flow Meters & Rotameters	(0.2 to 300) gpm	0.15 % IV	Cox 311AHT, IV is the indicated value
Gas Flow – Measure, Precision Gas Flow Meters, Sonic Nozzles, & Laminar Air Flow Devices	(0.01 to <10) slpm (10 to 700) slpm	0.4 % IV 0.2 % IV	Brooks 1050 Bell Prover (5 cu ft)

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[1] This laboratory offers commercial calibration service.

[2] "Best Uncertainty" is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards of nearly ideal measuring equipment. Best uncertainties represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The best uncertainty of a specific calibration performed by the laboratory may be greater than the best uncertainty due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

[3] In the statement of best uncertainty, L is the numerical value of the nominal length of the device measured in inches and R is the numerical value of the resolution of the device in microinches.